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1 [Towards interactive bump mapping with anisotropic shift-variant BRDFs](#)

Jan Kautz, Hans-Peter Seidel

 August 2000 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**

 Full text available: [pdf\(3.98 MB\)](#)

 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper a technique is presented that combines interactive hardware accelerated bump mapping with shift-variant anisotropic reflectance models. An evolutionary path is shown how some simpler reflectance models can be rendered at interactive rates on current low-end graphics hardware, and how features from future graphics hardware can be exploited for more complex models. We show how our method can be applied to some well known reflectance models, namely the Banks model, War ...

2 [Homomorphic factorization of BRDF-based lighting computation](#)

Lutz Latta, Andreas Kolb

 July 2002 **ACM Transactions on Graphics (TOG) , Proceedings of the 29th annual conference on Computer graphics and interactive techniques**, Volume 21 Issue 3

 Full text available: [pdf\(2.81 MB\)](#)

 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Several techniques have been developed to approximate Bidirectional Reflectance Distribution Functions (BRDF) with acceptable quality and performance for realtime applications. The recently published *Homomorphic Factorization* by McCool et al. is a general approximation approach that can be used with various setups and for different quality requirements. In this paper we propose a new technique based on the Homomorphic Factorization. Instead of approximating the BRDF, our technique factoriz ...

Keywords: illumination, reflectance & shading model, rendering, rendering hardware, texture mapping

3 [Homomorphic factorization of BRDFs for high-performance rendering](#)

Michael D. McCool, Jason Ang, Anis Ahmad

 August 2001 **Proceedings of the 28th annual conference on Computer graphics and interactive techniques**

 Full text available: [pdf\(2.33 MB\)](#)

 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A bidirectional reflectance distribution function (BRDF) describes how a material reflects light from its surface. To use arbitrary BRDFs in real-time rendering, a compression technique must be used to represent BRDFs using the available texture-mapping and computational capabilities of an accelerated graphics pipeline. We present a numerical


technique, homomorphic factorization, that can decompose arbitrary BRDFs into products of two or more factors of lower dimensionality, each factor de ...

Keywords: hardware accelerated rendering and shading

4 Session 3: light: Matrix radiance transfer

Jaakko Lehtinen, Jan Kautz

April 2003 **Proceedings of the 2003 symposium on Interactive 3D graphics**

Full text available:  [pdf\(8.07 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Precomputed Radiance Transfer allows interactive rendering of objects illuminated by low-frequency environment maps, including self-shadowing and interreflections. The expensive integration of incident lighting is partially precomputed and stored as matrices. Incorporating anisotropic, glossy BRDFs into precomputed radiance transfer has been previously shown to be possible, but none of the previous methods offer real-time performance. We propose a new method, *matrix radiance transfer*, which ...

Keywords: orthogonal projection, reflectance & shading models, shading, spherical harmonics

5 Lighting & sampling: Efficient BRDF importance sampling using a factored representation

Jason Lawrence, Szymon Rusinkiewicz, Ravi Ramamoorthi

August 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

Full text available:  [pdf\(398.48 KB\)](#)
 [mov\(24.59 MIN\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#)

High-quality Monte Carlo image synthesis requires the ability to importance sample realistic BRDF models. However, analytic sampling algorithms exist only for the Phong model and its derivatives such as Lafortune and Blinn-Phong. This paper demonstrates an importance sampling technique for a wide range of BRDFs, including complex analytic models such as Cook-Torrance and measured materials, which are being increasingly used for realistic image synthesis. Our approach is based on a compact factor ...

Keywords: BRDF, Global Illumination, Importance Sampling, Monte Carlo Integration, Ray Tracing, Rendering

6 A signal-processing framework for reflection

Ravi Ramamoorthi, Pat Hanrahan

October 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 4

Full text available:  [pdf\(272.24 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present a signal-processing framework for analyzing the reflected light field from a homogeneous convex curved surface under distant illumination. This analysis is of theoretical interest in both graphics and vision and is also of practical importance in many computer graphics problems---for instance, in determining lighting distributions and bidirectional reflectance distribution functions (BRDFs), in rendering with environment maps, and in image-based rendering. It is well known that und ...

Keywords: BRDF, Fourier analysis, environment maps, illumination, inverse rendering, reflection, signal processing, spherical harmonics

7 Object shape and reflectance modeling from observation

Yoichi Sato, Mark D. Wheeler, Katsushi Ikeuchi

August 1997 **Proceedings of the 24th annual conference on Computer graphics and**


interactive techniquesFull text available:  [pdf\(1.11 MB\)](#)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)**8 Image-based reconstruction of spatial appearance and geometric detail**Hendrik P. A. Lensch, Jan Kautz, Michael Goesele, Wolfgang Heidrich, Hans-Peter Seidel
April 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 2Full text available:  [pdf\(302.22 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Real-world objects are usually composed of a number of different materials that often show subtle changes even within a single material. Photorealistic rendering of such objects requires accurate measurements of the reflection properties of each material, as well as the spatially varying effects. We present an image-based measuring method that robustly detects the different materials of real objects and fits an average bidirectional reflectance distribution function (BRDF) to each of them. In or ...

Keywords: BRDF measurement, normal map acquisition, photometric stereo, shape from shading, spatially varying BRDFs

9 Shading and shadows: Fast, arbitrary BRDF shading for low-frequency lighting using spherical harmonics

Jan Kautz, Peter-Pike Sloan, John Snyder

July 2002 **Proceedings of the 13th Eurographics workshop on Rendering EGRW '02**Full text available:  [pdf\(3.93 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Real-time shading using general (e.g., anisotropic) BRDFs has so far been limited to a few point or directional light sources. We extend such shading to smooth, area lighting using a low-order spherical harmonic basis for the lighting environment. We represent the 4D product function of BRDF times the cosine factor (dot product of the incident lighting and surface normal vectors) as a 2D table of spherical harmonic coefficients. Each table entry represents, for a single view direction, the integ ...

10 Shading and shaders: Shader metaprogramming


Michael D. McCool, Zheng Qin, Tiberiu S. Popa

September 2002 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS conference on Graphics hardware**Full text available:  [pdf\(630.20 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Modern graphics accelerators have embedded programmable components in the form of vertex and fragment shading units. Current APIs permit specification of the programs for these components using an assembly-language level interface. Compilers for high-level shading languages are available but these read in an external string specification, which can be inconvenient. It is possible, using standard C++, to define a high-level shading language directly in the API. Such a language can be nearly indist ...

11 Clustered principal components for precomputed radiance transfer

Peter-Pike Sloan, Jesse Hall, John Hart, John Snyder

July 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 3Full text available:  [pdf\(9.29 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

We compress storage and accelerate performance of precomputed radiance transfer (PRT), which captures the way an object shadows, scatters, and reflects light. PRT records over many surface points a transfer matrix. At run-time, this matrix transforms a vector of spherical harmonic coefficients representing distant, low-frequency source lighting into exiting radiance. Per-point transfer matrices form a high-dimensional surface signal that we

compress using *clustered principal component analysis* ...

Keywords: *graphics hardware, illumination, monte carlo techniques, rendering, shadow algorithms*

12 Measurement and color matching: Efficient isotropic BRDF measurement

Wojciech Matusik, Hanspeter Pfister, Matthew Brand, Leonard McMillan

June 2003 **Proceedings of the 14th Eurographics workshop on Rendering EGRW '03**

Full text available:  [pdf\(5.65 MB\)](#)


Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

In this paper we present novel reflectance measurement procedures that require fewer total measurements than standard uniform sampling approaches. First, we acquire densely sampled reflectance data for a large collection of different materials. Using these densely sampled measurements we analyze the general surface reflectance function to determine the local signal variation at each point in the function's domain. We then use wavelet analysis to derive a common basis for all of the acquired refl ...

13 Precomputed radiance transfer for real-time rendering in dynamic, low-frequency lighting environments

Peter-Pike Sloan, Jan Kautz, John Snyder

July 2002 **ACM Transactions on Graphics (TOG) , Proceedings of the 29th annual conference on Computer graphics and interactive techniques**, Volume 21 Issue 3

Full text available:  [pdf\(5.37 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)


We present a new, real-time method for rendering diffuse and glossy objects in low-frequency lighting environments that captures soft shadows, interreflections, and caustics. As a preprocess, a novel global transport simulator creates functions over the object's surface representing transfer of arbitrary, low-frequency incident lighting into *transferred radiance* which includes global effects like shadows and interreflections from the object onto itself. At run-time, these transfer functio ...

Keywords: Monte Carlo techniques, graphics hardware, illumination, rendering, shadow algorithms

14 Predicting reflectance functions from complex surfaces

Stephen H. Westin, James R. Arvo, Kenneth E. Torrance

July 1992 **ACM SIGGRAPH Computer Graphics , Proceedings of the 19th annual conference on Computer graphics and interactive techniques**, Volume 26 Issue 2

Full text available:  [pdf\(8.26 MB\)](#)


Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: BRDF, Monte Carlo, anisotropic reflection, spherical harmonics

15 A signal-processing framework for inverse rendering

Ravi Ramamoorthi, Pat Hanrahan

August 2001 **Proceedings of the 28th annual conference on Computer graphics and interactive techniques**

Full text available:  [pdf\(1.01 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)


Realism in computer-generated images requires accurate input models for lighting, textures and BRDFs. One of the best ways of obtaining high-quality data is through measurements of scene attributes from real photographs by *inverse rendering*. However, inverse rendering methods have been largely limited to settings with highly controlled lighting. One of the reasons for this is the lack of a coherent mathematical framework for inverse rendering under general illumination conditions. Our ...

Keywords: BRDF, illumination, inverse rendering, irradiance, light field, radiance, signal processing, spherical harmonics

16 Measurement and color matching: Recovering 3-D shape and reflectance from a small number of photographs

Athinodoros S. Georghiades

June 2003 **Proceedings of the 14th Eurographics workshop on Rendering EGRW '03**

Full text available:  pdf(1.31 MB)


Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

There are computer graphics applications for which the shape and reflectance of complex objects, such as faces, cannot be obtained using specialized equipment due to cost and practical considerations. We present an image based technique that uses only a small number of example images, and assumes a parametric model of reflectance, to simultaneously and reliably recover the Bidirectional Reflectance Distributions Function (BRDF) and the 3-D shape of non-Lambertian objects. No information about th ...

17 Appearance & illumination: A frequency analysis of light transport

Frédo Durand, Nicolas Holzschuch, Cyril Soler, Eric Chan, François X. Sillion

July 2005 **ACM Transactions on Graphics (TOG)**, Volume 24 Issue 3

Full text available:  pdf(6.20 MB)

Additional Information: [full citation](#), [abstract](#), [references](#)

We present a signal-processing framework for light transport. We study the frequency content of radiance and how it is altered by phenomena such as shading, occlusion, and transport. This extends previous work that considered either spatial or angular dimensions, and it offers a comprehensive treatment of both space and angle. We show that occlusion, a multiplication in the primal, amounts in the Fourier domain to a convolution by the spectrum of the blocker. Propagation corresponds to a shear in ...

Keywords: Fourier analysis, light transport, signal processing

18 Precomputed light transport: Local, deformable precomputed radiance transfer

Peter-Pike Sloan, Ben Luna, John Snyder

July 2005 **ACM Transactions on Graphics (TOG)**, Volume 24 Issue 3

Full text available:  pdf(688.87 KB)

Additional Information: [full citation](#), [abstract](#), [references](#)

Precomputed radiance transfer (PRT) captures realistic lighting effects from distant, low-frequency environmental lighting but has been limited to static models or precomputed sequences. We focus on PRT for local effects such as bumps, wrinkles, or other detailed features, but extend it to arbitrarily deformable models. Our approach applies zonal harmonics (ZH) which approximate spherical functions as sums of circularly symmetric Legendre polynomials around different axes. By spatially varying b ...

Keywords: lighting environments, nonlinear optimization, soft shadows, spherical harmonics, subsurface scattering, texture maps, zonal harmonics

19 Realistic, hardware-accelerated shading and lighting

Wolfgang Heidrich, Hans-Peter Seidel

July 1999 **Proceedings of the 26th annual conference on Computer graphics and interactive techniques**

Full text available:  pdf(212.34 KB)



Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: frame buffer techniques, illumination effects, reflectance functions, rendering hardware, shading, texture mapping

**20** Lighting & sampling: Triple product wavelet integrals for all-frequency relighting

Ren Ng, Ravi Ramamoorthi, Pat Hanrahan

August 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

Full text available:  pdf(365.55 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index](#)
 mov(25:51 MIN) [terms](#)

This paper focuses on efficient rendering based on pre-computed light transport, with realistic materials and shadows under all-frequency direct lighting such as environment maps. The basic difficulty is representation and computation in the 6D space of light direction, view direction, and surface position. While image-based and synthetic methods for real-time rendering have been proposed, they do not scale to high sampling rates with variation of both lighting and viewpoint. Current approaches ...





Keywords: Haar Wavelets, Image-Based Rendering, Non-linear Approximation, Pre-computed Radiance Transfer, Relighting

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L10: Entry 1 of 10

File: USPT

Jul 26, 2005

US-PAT-NO: 6921898

DOCUMENT-IDENTIFIER: US 6921898 B1

TITLE: Bi-directional reflectance distribution function determination by large scale field measurement

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	RMC	Draw Desc	Image
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☐ 2. Document ID: US 6888627 B2

L10: Entry 2 of 10

File: USPT

May 3, 2005

US-PAT-NO: 6888627

DOCUMENT-IDENTIFIER: US 6888627 B2

TITLE: Optical scanning system for surface inspection

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	RMC	Draw Desc	Image
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☐ 3. Document ID: US 6858826 B2

L10: Entry 3 of 10

File: USPT

Feb 22, 2005

US-PAT-NO: 6858826

DOCUMENT-IDENTIFIER: US 6858826 B2

TITLE: Method and apparatus for scanning three-dimensional objects

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	RMC	Draw Desc	Image
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☐ 4. Document ID: US 6697066 B2

L10: Entry 4 of 10

File: USPT

Feb 24, 2004

US-PAT-NO: 6697066

DOCUMENT-IDENTIFIER: US 6697066 B2

TITLE: Graphics system

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	RMC	Draw Desc	Image
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☐ 5. Document ID: US 6414302 B1

L10: Entry 5 of 10

File: USPT

Jul 2, 2002

US-PAT-NO: 6414302

DOCUMENT-IDENTIFIER: US 6414302 B1

TITLE: High photon energy range reflected light characterization of solids

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw Desc	Image
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☐ 6. Document ID: US 5729640 A

L10: Entry 6 of 10

File: USPT

Mar 17, 1998

US-PAT-NO: 5729640

DOCUMENT-IDENTIFIER: US 5729640 A

TITLE: Process of acquiring with an X=Y scannable array camera light emanated from a subject

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw Desc	Image
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☐ 7. Document ID: US 5640246 A

L10: Entry 7 of 10

File: USPT

Jun 17, 1997

US-PAT-NO: 5640246

DOCUMENT-IDENTIFIER: US 5640246 A

TITLE: Apparatus for measuring reflected light utilizing spherically arranged optical fibers

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw Desc	Image
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☐ 8. Document ID: US 5615294 A

L10: Entry 8 of 10

File: USPT

Mar 25, 1997

US-PAT-NO: 5615294

DOCUMENT-IDENTIFIER: US 5615294 A

TITLE: Apparatus for collecting light and its method of manufacture

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw Desc	Image
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☐ 9. Document ID: US 5475617 A

L10: Entry 9 of 10

File: USPT

Dec 12, 1995

US-PAT-NO: 5475617

DOCUMENT-IDENTIFIER: US 5475617 A

TITLE: Process of reconstructing a single data profile of rapidly measured hemispherical scattered or radiated light

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KAMC	Draw Desc	Image
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☐ 10. Document ID: US 5313542 A

L10: Entry 10 of 10

File: USPT

May 17, 1994

US-PAT-NO: 5313542

DOCUMENT-IDENTIFIER: US 5313542 A

TITLE: Apparatus and method of rapidly measuring hemispherical scattered or radiated light

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KAMC	Draw Desc	Image
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Jul 26, 2005

US-PAT-NO: 6921898

DOCUMENT-IDENTIFIER: US 6921898 B1

TITLE: Bi-directional reflectance distribution function determination by large scale field measurement

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWAC	Draw Desc	Image
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☐ 2. Document ID: US 6888627 B2

L9: Entry 2 of 21

File: USPT

May 3, 2005

US-PAT-NO: 6888627

DOCUMENT-IDENTIFIER: US 6888627 B2

TITLE: Optical scanning system for surface inspection

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWAC	Draw Desc	Image
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☐ 3. Document ID: US 6858826 B2

L9: Entry 3 of 21

File: USPT

Feb 22, 2005

US-PAT-NO: 6858826

DOCUMENT-IDENTIFIER: US 6858826 B2

TITLE: Method and apparatus for scanning three-dimensional objects

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWAC	Draw Desc	Image
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☐ 4. Document ID: US 6788398 B1

L9: Entry 4 of 21

File: USPT

Sep 7, 2004

US-PAT-NO: 6788398

DOCUMENT-IDENTIFIER: US 6788398 B1

TITLE: Far-field scanning apparatus and method for rapid measurement of light source characteristics with high dynamic range

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWAC	Draw Desc	Image
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☐ 5. Document ID: US 6750968 B2

L9: Entry 5 of 21

File: USPT

Jun 15, 2004

US-PAT-NO: 6750968

DOCUMENT-IDENTIFIER: US 6750968 B2

TITLE: Differential numerical aperture methods and device

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMNC	Draw Desc	Image
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☐ 6. Document ID: US 6697066 B2

L9: Entry 6 of 21

File: USPT

Feb 24, 2004

US-PAT-NO: 6697066

DOCUMENT-IDENTIFIER: US 6697066 B2

TITLE: Graphics system

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMNC	Draw Desc	Image
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☐ 7. Document ID: US 6639594 B2

L9: Entry 7 of 21

File: USPT

Oct 28, 2003

US-PAT-NO: 6639594

DOCUMENT-IDENTIFIER: US 6639594 B2

**** See image for Certificate of Correction ****

TITLE: View-dependent image synthesis

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMNC	Draw Desc	Image
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☐ 8. Document ID: US 6414302 B1

L9: Entry 8 of 21

File: USPT

Jul 2, 2002

US-PAT-NO: 6414302

DOCUMENT-IDENTIFIER: US 6414302 B1

TITLE: High photon energy range reflected light characterization of solids

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMNC	Draw Desc	Image
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☐ 9. Document ID: US 5853897 A

L9: Entry 9 of 21

File: USPT

Dec 29, 1998

US-PAT-NO: 5853897

DOCUMENT-IDENTIFIER: US 5853897 A

**** See image for Certificate of Correction ****

TITLE: Substrate coated with highly diffusive metal surface layer

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWC	Draw Desc	Image
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☐ 10. Document ID: US 5817422 A

L9: Entry 10 of 21

File: USPT

Oct 6, 1998

US-PAT-NO: 5817422

DOCUMENT-IDENTIFIER: US 5817422 A

**** See image for Certificate of Correction ****

TITLE: Optical apparatus having a highly diffusive metal surface layer

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWC	Draw Desc	Image
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☐ 11. Document ID: US 5784023 A

L9: Entry 11 of 21

File: USPT

Jul 21, 1998

US-PAT-NO: 5784023

DOCUMENT-IDENTIFIER: US 5784023 A

TITLE: Speed detection method

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMOC	Draw Desc	Image
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☐ 12. Document ID: US 5765578 A

L9: Entry 12 of 21

File: USPT

Jun 16, 1998

US-PAT-NO: 5765578

DOCUMENT-IDENTIFIER: US 5765578 A

** See image for Certificate of Correction **

TITLE: Carbon dioxide jet spray polishing of metal surfaces

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMOC	Draw Desc	Image
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☐ 13. Document ID: US 5729640 A

L9: Entry 13 of 21

File: USPT

Mar 17, 1998

US-PAT-NO: 5729640

DOCUMENT-IDENTIFIER: US 5729640 A

TITLE: Process of acquiring with an X=Y scannable array camera light emanted from a subject

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMOC	Draw Desc	Image
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☐ 14. Document ID: US 5640246 A

L9: Entry 14 of 21

File: USPT

Jun 17, 1997

US-PAT-NO: 5640246

DOCUMENT-IDENTIFIER: US 5640246 A

TITLE: Apparatus for measuring reflected light utilizing spherically arranged optical fibers

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMOC	Draw Desc	Image
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☐ 15. Document ID: US 5637873 A

L9: Entry 15 of 21

File: USPT

Jun 10, 1997

US-PAT-NO: 5637873

DOCUMENT-IDENTIFIER: US 5637873 A

**** See image for Certificate of Correction ****

TITLE: Directional reflectometer for measuring optical bidirectional reflectance

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw Desc	Image
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☐ 16. Document ID: US 5615294 A

L9: Entry 16 of 21

File: USPT

Mar 25, 1997

US-PAT-NO: 5615294

DOCUMENT-IDENTIFIER: US 5615294 A

TITLE: Apparatus for collecting light and its method of manufacture

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw Desc	Image
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☐ 17. Document ID: US 5475617 A

L9: Entry 17 of 21

File: USPT

Dec 12, 1995

US-PAT-NO: 5475617

DOCUMENT-IDENTIFIER: US 5475617 A

TITLE: Process of reconstructing a single data profile of rapidly measured hemispherical scattered or radiated light

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw Desc	Image
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☐ 18. Document ID: US 5426506 A

L9: Entry 18 of 21

File: USPT

Jun 20, 1995

US-PAT-NO: 5426506

DOCUMENT-IDENTIFIER: US 5426506 A

**** See image for Certificate of Correction ****

TITLE: Optical method and apparatus for detection of surface and near-subsurface defects in dense ceramics

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw Desc	Image
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☐ 19. Document ID: US 5326454 A

L9: Entry 19 of 21

File: USPT

Jul 5, 1994

US-PAT-NO: 5326454

DOCUMENT-IDENTIFIER: US 5326454 A

TITLE: Method of forming electrodeposited anti-reflective surface coatings

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw Desc	Image
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☐ 20. Document ID: US 5313542 A

L9: Entry 20 of 21

File: USPT

May 17, 1994

US-PAT-NO: 5313542

DOCUMENT-IDENTIFIER: US 5313542 A

TITLE: Apparatus and method of rapidly measuring hemispherical scattered or radiated light

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw Desc	Image
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☐ 21. Document ID: US 4368983 A

L9: Entry 21 of 21

File: USPT

Jan 18, 1983

US-PAT-NO: 4368983

DOCUMENT-IDENTIFIER: US 4368983 A

TITLE: Absolute reflectometer

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KMC	Draw Desc	Image
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<u>L10</u>	L9 and matrix	10	<u>L10</u>
<u>L9</u>	L7 and normal	21	<u>L9</u>
<u>L8</u>	L7 and (light adj1 source)	18	<u>L8</u>
<u>L7</u>	L6 and light	24	<u>L7</u>
<u>L6</u>	L5 and reflectivity	24	<u>L6</u>
<u>L5</u>	BRDF or (programable adj1 pixel adj1 shader)	85	<u>L5</u>

DB=PGPB; PLUR=YES; OP=OR

<u>L4</u>	20040061700	1	<u>L4</u>
<u>L3</u>	20040155911	1	<u>L3</u>
<u>L2</u>	20050088443	1	<u>L2</u>
<u>L1</u>	20050091608	1	<u>L1</u>

END OF SEARCH HISTORY